

Phillip Alampi Beneficial Insect Laboratory Activity Report in Natural Areas for the Year 2002

**Purple Loosestrife And Hemlock Woolly Adelgid
Beneficial Insect Release Programs**

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Purple Loosestrife Program

The Phillip Alampi Beneficial Insect Laboratory has been working in two natural areas with this program: Whittingham WMA and Black River WMA. Monitoring quadrats have been set up at Whittingham and yearly photos have been taken at both WMA's during peak flowering. Table 1 shows the number of *Galerucella* spp. loosestrife feeding beetles that have been released in New Jersey since the program began in 1997. Table 2 shows the number of beetles released at Whittingham and at Black River.

Table 1. Number of *Galerucella* spp. Beetles Released, 1997 – 2002

Year	No. Released	No. Release Sites
1997	50,030	5 (5) ¹
1998	222,283	8 (3)
1999	228,363	20 (19)
2000	353,251	20 (13)
2001	242,875	14 (13)
2002	203,573	20 (12)
Totals	1,300,375	73

¹Numbers in parenthesis are the number of **new** release sites for the year.

**Table 2. Number of *Galerucella* spp. Beetles Released, 1997 – 2002
At Whittingham and Black River WMA**

Site	Year	No. <i>Galerucella</i> spp. Released	Site Total
Whittingham	1997	1,392	56,679
	1998	41,787	
	2000	13,500	
Black River	2000	42,801	101,296
	2001	50,345	
	2002	8,150	

The beetles were released in 1997, 1998 and 2000 at Whittingham and in 2000, 2001 and 2002 in Black River. The beetles were released late in 1997 at Whittingham which accounts for the small number of beetles. Black River WMA has received a large number of beetles but the site itself is huge. The quadrat data at Whittingham is inconclusive at this time but the photographic evidence is starting to show some reduction in flowering (Figure 1.) The photos are not the best but there is much less flowering in the 2001 photo versus the 1998 photo. The 2002 photos did not come out.



1998



2001

Photos by M. Mayer

Figure 1. Whittingham WMA in 1998 and 2001.

All indications are that the program is working.



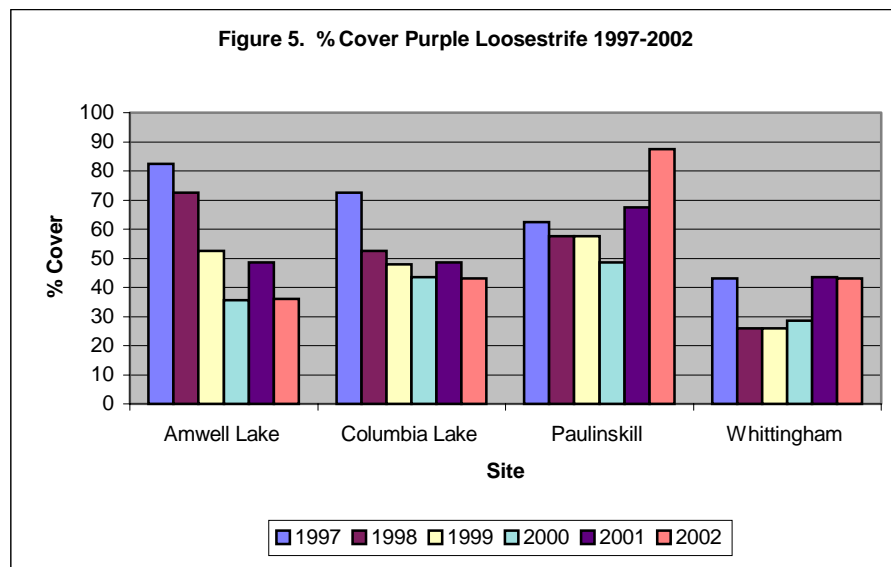
Photo by R.C. Chianese

Figure 2. Close up of Amwell Lake in 1999 (top) and 2000

Figure 2 shows the result at Amwell Lake WMA in 1999 and in 2000, when the *Galerucella* spp. population exploded. There was almost no flowering and the plants were devastated. It was quite dramatic. This happened because Amwell Lake received more beetles per acre than any other site. The WMA is in close proximity to the Phillip Alampi Beneficial Insect Laboratory and has more moderate temperatures early in the season when the temperature at many of the more northerly sites was too low to allow for

beetle releases. Although Amwell Lake is not a natural area it is an example of what we can expect to occur at Whittingham and Black River in the future.

Figure 3 shows the percent coverage category ratings of the 5 sites for which we keep quadrat data. The % cover indicates what percentage of the quadrat that the purple loosestrife occupies as opposed to other plant species. The overall trend for purple loosestrife is down even though the purple loosestrife % cover did increase in the quadrats in 2001. Native vegetation is coming back. After what we have seen at Amwell Lake, the amount of purple loosestrife should dramatically decrease over time.



Hemlock Woolly Adelgid

No releases of the beneficial lady beetle, *Pseudoscymnus tsugae*, were made into new Natural area sites in 2002 due to low hemlock woolly adelgid populations. Hemlock woolly adelgid populations in the Natural Areas were low due to the lack of new growth on the hemlock trees.

Table 3. Releases of *P. tsugae* in Natural Areas 1999-2001

Date	Number	County	Location	Latitude	Longitude
5/11/99	5,000	Morris	Hacklebarney State Park	N 40° 44.944	W 74°43.512
5/11/99	5,000	Hunterdon	Ken Lockwood Gorge W.M.A.	N 40°41.697	W 74°52.404
5/14/99	5,000	Sussex	Tillman's Ravine	N 41°9.412	W 74°51.791
5/11/99	5,000	Sussex	Wawayanda Hemlock Ravine	N 41°12.407	W 74°24.505

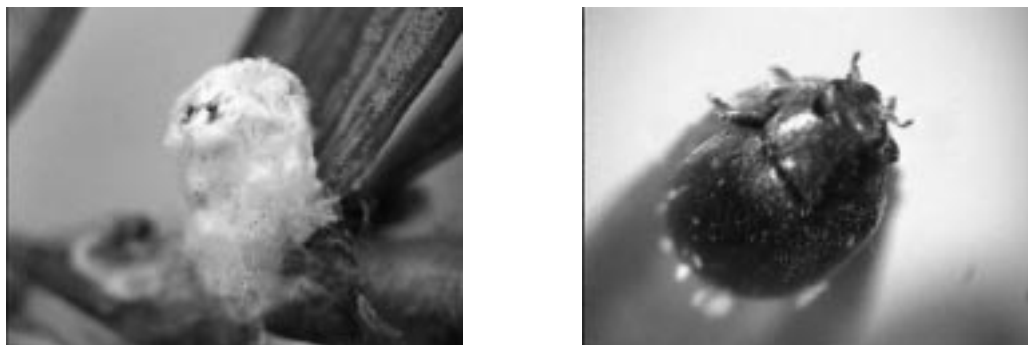
5/21/99	5,000	Warren	Dunnfield Creek, Worthington State Forest	N 40°59.354	W 75°5.488
5/26/00	2,500	Sussex	Tillman's Ravine	N 41°9.412	W 74°51.791
5/12/00	2,500	Sussex	Wawayanda Hemlock Ravine Natural Area	N 41°12.407	W 74°24.505
5/17/00	2,500	Sussex	Wawayanda Swamp Natural Area	N 41°11.120	W 74°25.410
5/3/01	5,000	Passaic	Wawayanda State Park-Clinton Rd.	N 41°8.376	W 74°24.506
Total	37,500				

Table 4. shows the total number of beetles released in New Jersey per year for the past four years. Roughly 18% of all the beetles released have gone into Natural Areas. Recoveries of over wintering beetles have been made in past years in Wawayanda State Park, Worthington State Forest, and in Tillman's Ravine Natural Area. This does not mean that the beetles are not in the other natural areas. Once the beetles have dispersed, they are difficult to find because of their small size and the expanse of area to be sampled.

Table 4. *P. tsugae* Releases

No. Beetles	
Year	Released
1998	50,500
1999	65,500
2000	55,000
2001	34,500
2002	40,260
Total	245,760

The hemlocks in the John D. Kuser Natural Area were checked for the presence of the hemlock woolly adelgid but since only low levels were found, no releases were made into that site in 2002. The Kuser Natural Area will most likely receive a release in 2003.



photos by J. Zhang and J Lashomb, Rutgers University

Figure 6. The Hemlock Woolly Adelgid And The Lady Beetle That Preys On It, *P. tsugae*.

Figure 6 shows the hemlock woolly adelgid and *P. tsugae*. Recovery of *P. tsugae* was difficult this season due to the dearth of adelgids due to a lack of new growth. The only over wintering recoveries of *P. tsugae* that were made in 2002 were in Worthington State

Forest and at Wawayanda State Park near Bearfort Mt. When the beetles are first released, they are easily found at ground level at the release site but in August they become more difficult to find. Dr. Mark McClure of the Connecticut Agricultural Experiment Station had hypothesized that the beetles migrate up the tree to where the hemlock woolly adelgid might be more readily found. The beetles do exhibit this behavior in the laboratory cages. Using a 50 ft. bucket truck and boom both Dr. McClure and the Phillip Alampi Beneficial Insect Laboratory were able to show that even if there were no *P. tsugae* at ground level, they were able to be found in the canopy. Previously, all surveys were done at ground level. Also, the Phillip Alampi Beneficial Insect Laboratory did a distribution survey of a 2001 release site in Stokes State Forest and found that the beetles do migrate up and then out from the release tree.

Figure 7 shows what can happen at an adelgid-infested site if nothing is done. The photos are of a site near Johnson Lake in Sussex County. Mortality there is over 90% and the remaining trees are severely stressed. The photos were taken in August.



Photos by L. Bronhard

Figure 7. Hemlock Woolly Adelgid Caused Mortality at Johnson Lake.

The devastation that the hemlock woolly adelgid can cause along with other secondary pests such as elongate hemlock scale, *Fiorinia externa* and the hemlock borer, *Melanophila fulvoguttata* is quite depressing, especially when you see it in a forest that was quite vigorous under ten years ago.

The Phillip Alampi Beneficial Insect Laboratory will be working to try to prevent further occurrence of this but it will take time. The key part in any biological control program is the numerical response (how fast something reproduces) of the beneficial organism. *P. tsugae* have shown that they do reproduce in the field but it will be some time yet before their population levels reach a point where they are easily found. Traditionally, that indicates that the biological control organism is a success. The reproduction of the *P. tsugae* in the field is dependent on the amount of hemlock woolly adelgid that is there; hemlock woolly adelgid populations are down at the moment but that is due more a lack of new growth on the hemlock than to the beetles. The adelgid essentially eats itself out

of house and home, the trees recover and then the adelgid attacks again. It will be some time before it is known what the effect the releases of the *P. tsugae* will have on the host population and the recovery of the hemlocks.